

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) ~~A method of cleaning a treatment apparatus including a chamber, a susceptor in the chamber, a first tank of a treatment agent, a vaporizer to vaporize the treatment agent, a first pipe connecting the first tank and the vaporizer, a second pipe connecting the vaporizer and a first opening of the chamber, the second pipe supplying the vaporized treatment agent into the chamber, a second tank of a cleaning agent, a third pipe connecting the second tank and the vaporizer, a vacuum pump, and a forth pipe connecting the vacuum pump and a second opening of the chamber to evacuate an atmosphere from the chamber, the method comprising:~~

~~forming a material including a metal on a wall inside the chamber of the treatment apparatus by supplying the vaporized treatment agent into the chamber;~~

~~heating the wall;~~

~~vaporizing the cleaning agent comprising one of a carboxylic acid and a derivative of carboxylic acid;~~

~~supplying the vaporized cleaning agent into the chamber through the first opening;~~

~~forming a metal complex of the metal and the cleaning agent on the heated wall by contacting the vaporized cleaning agent with the material;~~

~~subliming the metal complex on the heated wall under a reduced pressure; and~~

~~exhausting the sublimed metal complex from the chamber through the second opening~~  
for removing a metal film formed inside a treatment apparatus that is configured to form a metal film on a substrate, the treatment apparatus comprising (a) a first source supplying a treatment agent; (b) a second source supplying a cleaning agent comprising one of a carboxylic acid and a derivative of a carboxylic acid; (c) a vaporizer vaporizing the treatment agent and the cleaning agent; (d) a first pipe connecting the first source and the vaporizer, and supplying the treatment agent from the first source to the vaporizer; (e) a second pipe connecting the second source and the vaporizer, and supplying the cleaning agent from the second source to the vaporizer; (f) a chamber for forming the metal film on a substrate; (g) a susceptor mounting the substrate in the chamber; (h) a third pipe connecting the vaporizer and the chamber, and supplying the vaporized treatment agent or the vaporized cleaning

agent from the vaporizer to the chamber; (i) a vacuum pump exhausting the chamber; and (j) a heat source heating the vaporizer, the third pipe, and the chamber, the method comprising:

- (i) forming the metal film inside the chamber;
- (ii) reducing a pressure in the chamber, the third pipe, and the vaporizer;
- (iii) heating the vaporizer, the third pipe, and the chamber by the heat source over a predetermined temperature;
- (iv) supplying the cleaning agent comprising one of the carboxylic acid and the derivative from the second source to the vaporizer through the second pipe to vaporize the cleaning agent;
- (v) supplying the vaporized cleaning agent from the vaporizer into the chamber through the third pipe;
- (vi) reacting the metal of the metal film and the vaporized cleaning agent to form a metal complex of the metal and the cleaning agent;
- (vii) subliming the metal complex by a heat of the heat source; and
- (viii) exhausting the sublimed metal complex by the vacuum pump to clean the chamber.

2. (Cancelled).

3. (Currently Amended) The method of cleaning of claim 1, wherein ~~the cleaning agent~~ one of the carboxylic acid and the derivative comprises a compound selected from the group comprising RCOOH, RCOOR', and R(COOH)<sub>n</sub>, wherein R, R' are hydrocarbon groups containing halogen atoms, and wherein n is an integer.

4. (Currently Amended) The method of cleaning of claim 1, wherein the ~~cleaning agent~~ carboxylic acid comprises trifluoroacetic acid.

5. (Currently Amended) The method of cleaning of claim 1, wherein the treatment apparatus is ~~one of a chemical vapor deposition equipment and a physical vapor deposition equipment.~~

6. (Cancelled).

7. (Currently Amended) The method of cleaning of claim 1, further comprising:

supplying an additive to the vaporized cleaning agent to promote formation of the metal complex of the cleaning agent and the metal.

8. (Previously Presented) The method of cleaning of claim 7, wherein the additive includes oxygen or water vapor.

9. (Currently Amended) ~~A method of cleaning a treatment apparatus including a chamber, a susceptor in the chamber, a first tank of a treatment agent, a vaporizer to vaporize the treatment agent, a first pipe connecting the first tank and the vaporizer, a second pipe connecting the vaporizer and a first opening of the chamber, the second pipe supplying the vaporized treatment agent into the chamber, a second tank of a cleaning agent, a third pipe connecting the second tank and the vaporizer, a vacuum pump, and a forth pipe connecting the vacuum pump and a second opening of the chamber to evacuate an atmosphere from the chamber, the method comprising:~~

~~forming a material including a metal on a wall inside the chamber of the treatment apparatus by supplying the vaporized treatment agent into the chamber;~~

~~heating the wall;~~

~~vaporizing the cleaning agent comprising one of a carboxylic acid and a derivative of a carboxylic acid;~~

~~supplying the vaporized cleaning agent into the chamber through the first opening;~~

~~forming a metal complex of the metal and the cleaning agent on the heated wall by contacting the vaporized cleaning agent with the material;~~

~~subliming the metal complex on the heated wall under a reduced pressure;~~

~~repeating said vaporizing the cleaning agent, repeating said supplying the vaporized cleaning agent, repeating said forming the metal complex, and repeating said subliming the metal complex; and~~

~~exhausting the sublimed metal complex from the chamber through the second opening~~

The method of cleaning of claim 1, further comprising:

repeating said supplying the cleaning agent, repeating said supplying the vaporized cleaning agent, repeating said reacting the metal and the vaporized cleaning agent, and repeating said subliming the metal complex.

10. – 16. (Cancelled).

17. (Currently Amended) ~~A method of cleaning a treatment apparatus including a chamber, a susceptor in the chamber, a first tank of a treatment agent, a vaporizer to vaporize the treatment agent, a first pipe connecting the first tank and the vaporizer, a second pipe connecting the vaporizer and a first opening of the chamber, the second pipe supplying the vaporized treatment agent into the chamber, a second tank of a cleaning agent, a third pipe connecting the second tank and the vaporizer, a vacuum pump, and a forth pipe connecting the vacuum pump and a second opening of the chamber to evacuate an atmosphere from the chamber, the method comprising:~~

~~forming a material including copper on a wall inside the chamber of the treatment apparatus by supplying the vaporized treatment agent into the chamber;~~

~~heating the wall;~~

~~vaporizing the cleaning agent comprising one of a carboxylic acid and a derivative of carboxylic acid;~~

~~forming a copper complex on the heated wall by contacting the vaporized cleaning agent with the material including copper;~~

~~subliming the copper complex with a heat source; and~~

~~exhausting the sublimed copper complex from the chamber through the second opening~~

The method of cleaning of claim 1,

wherein the metal is copper.

18. (Currently Amended) The method of cleaning of claim 17, wherein, in said subliming the copper metal complex, the metal complex is copper complex and the copper complex is heated at a temperature of at least 150°C.

19. (Currently Amended) The method of cleaning of claim 17, wherein, in said ~~forming a copper complex~~ reacting the metal and the vaporized cleaning agent, the pressure of the vaporized cleaning agent is at least 10 Torr.

20. (Cancelled).

21. (Currently Amended) The method of cleaning of claim 17, further comprising: confirming the existence of the material inside the chamber; and

repeating said ~~vaporizing~~ supplying the cleaning agent, repeating said supplying the vaporized cleaning agent, repeating said reacting the copper and the cleaning agent, and repeating said subliming the copper complex, if the existence of material inside the chamber is confirmed.

22. (Currently Amended) The method of cleaning of claim 17, wherein in forming the ~~material~~ metal film, the ~~material~~ metal film including copper is formed from  $\text{Cu}^{+1}$  (hexafluoroacetylacetonate) and silylolefin ligand.

23. (Previously Presented) The method of cleaning of claim 22, wherein the silylolefin ligand is selected from the group consisting of trimethylvinylsilane (TMVS), dimethoxymethylvinylsilane (DMOMVS), methoxydimethylvinylsilane (MODMVS), trimethoxyvinylsilane (TMOVS), triethoxyvinylsilane (TEOVS), ethoxymethoxymethylvinylsilane (EOMOMVS), diethoxymethylvinylsilane (DEOMVS), diethoxymethoxyvinylsilane (DEOMOVVS), ethoxydimethoxyvinylsilane (EODMOVVS), ethoxydiethylvinylsilane (EODEVS), diethoxyethylvinylsilane (DEOEVS), dimethoxyethylvinylsilane (DMOEVS), ethoxydimethylvinylsilane (EODMVS), methoxydiethylvinylsilane (MODEVS) and ethylmethoxymethylvinylsilane (EMOMVS).

24. – 27. (Cancelled).

28. (Currently Amended) The method of cleaning of claim 1, wherein in said heating the ~~wall~~, the ~~wall is heated at a temperature of at least~~ predetermined temperature is 300 °C.

29. – 30. (Cancelled).

31. (New) The method of cleaning of claim 1, further comprising:  
supplying water vapor into the chamber,  
wherein the carboxylic acid is trifluoroacetic acid, and  
reacting includes reacting the metal and the vaporized cleaning agent in a presence of the supplied water vapor.

32. (New) The method of cleaning of claim 1,  
wherein the vaporizer has a first opening, a second opening, and a third opening  
between the first opening and the second opening,  
the first pipe connects to the first opening of the vaporizer,  
the second pipe connects to the third opening of the vaporizer, and  
the third pipe connects to the second opening of the vaporizer.